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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Richard G. Mallinson, et al.) Art Unit: Not Yet Assigned
Serial No.: Not Yet Assigned) Examiner: Not Yet Assigned
Filed: Herewith)
For: APPARATUS FOR STREAM) Atty. Dkt. No. 5820.617
CONVERSIONS AND METHODS)
OF USE)

Commissioner for Patents
Washington, D. C. 20231

PRELIMINARY AMENDMENT

Sir:

Pursuant to 37 C.F.R. § 1.115, Applicants herein seek to amend the above application as shown below, prior to the first examination and action of the United States Patent and Trademark Office.

In the Title:

Please replace the title as amended.

APPARATUS FOR STREAM CONVERSION AND METHODS OF USE

In the Specification:

Please replace the following paragraphs as amended. A redline version of the amendments is attached hereto as Attachment A.

[0001] This application is a continuation of U.S. Patent Application Serial No. 09/597,289, filed

June 20, 2000, entitled "APPARATUS FOR STREAM CONVERSION AND METHODS OF USE," which is a continuation of U.S. Patent Application Serial No. 09/006,739, filed January 14, 1998, entitled "CONVERSION METHOD FOR GAS STREAMS CONTAINING HYDROCARBONS," now U.S. Patent No. 6,159,432; which is a continuation-in-part application of U.S. Patent Application Serial No. 08/813,813, filed March 6, 1997, entitled "METHOD OF CONVERTING A GAS STREAM CONTAINING HYDROCARBONS TO COMPLEX HYDROCARBONS HAVING AT LEAST TWO CARBON ATOMS," now abandoned; and which claims priority under 35 U.S.C. § 119(e) of U.S. Provisional Application Serial No. 60/035,900, filed January 23, 1997, entitled "METHOD OF CONVERTING A GAS STREAM CONTAINING HYDROCARBONS TO COMPLEX HYDROCARBONS HAVING AT LEAST TWO CARBON ATOMS," the contents of which are hereby expressly incorporated in their entirety by reference.

[0002] This invention was developed through assistance with the U.S. Department of Energy, under contract number DE-FG21-94MC31170. The Government has certain rights in this invention.

In the Claims:

Please cancel claims 16-22 and 48-53.

Please amend the following claims:

1. An apparatus for converting a gas stream containing hydrocarbons to a reaction product containing effluent molecules having at least one carbon atom, comprising:
 - a housing, having at least one interior surface and at least one exterior surface;
 - a first electrode and a spatially disposed second electrode;
 - means for producing a plasma discharge between the first electrode and the second electrode;

means for passing the gas stream containing hydrocarbons between the first electrode and the second electrode; and

means for collecting the reaction product effluent produced by the reaction of the gas stream containing hydrocarbons with the plasma discharge between the first and second electrodes.

2. The apparatus of claim 1, wherein at least one of the first and second electrodes is positioned within the housing.

10. The apparatus of claim 1, further comprising means for condensing the effluent wherein the condensing means is operably located within the housing.

31. The apparatus of claim 30, wherein the zeolite is chemically altered, physically altered, combined with other components, or combinations thereof, to provide a zeolite having a substantially changed activity.

32. A method for converting a gas stream containing hydrocarbons to a reaction product effluent containing molecules having at least one carbon atom, comprising the steps of:

providing an apparatus, wherein the apparatus comprises,

a housing having at least one interior surface and at least one exterior surface,

a first electrode and a spatially disposed second electrode,

means for producing a plasma discharge between the first and second electrodes,

means for passing the gas stream containing hydrocarbons between the first and second electrodes; and

means for collecting a reaction product effluent from the housing;

producing a plasma discharge between the first and second electrodes;

introducing a gas stream containing hydrocarbons into the housing, wherein the gas stream is passed into the plasma discharge causing the hydrocarbons within the gas stream to be converted into reacted hydrocarbons having at least two carbon atoms; and

collecting the reacted hydrocarbons as an effluent from the housing.

33. The method of claim 32, wherein in the step of providing the apparatus, the apparatus further comprises at least one spacing member operably associated with at least one of the first and second electrodes.

41. The method of claim 39, wherein in the step of condensing the effluent, the condensed effluent is a liquid.

62. The method of claim 61, wherein in the step of providing a layer of material, the zeolite is chemically altered, physically altered, combined with other components, or combinations thereof to provide a zeolite having a substantially changed activity.

63. A method for converting a gas stream containing hydrocarbons to a reaction product effluent containing molecules having at least one carbon atom and at least some of the molecules

containing an oxygen atom, comprising the steps of:

providing an apparatus, wherein the apparatus comprises,

a housing having at least one interior surface and at least one exterior surface,

a first electrode and a spatially disposed second electrode,

means for producing a plasma discharge between the first and second electrodes,

means for passing the gas stream containing hydrocarbons between the first and second electrodes; and

means for collecting the reaction product effluent from the housing;

producing a plasma discharge between the first and second electrodes;

introducing a gas stream containing hydrocarbons and oxygen into the housing, wherein the gas stream is passed into the plasma discharge causing the hydrocarbons within the gas stream to be converted into reacted hydrocarbons having at least two carbon atoms; and

collecting the reacted hydrocarbons as an effluent from the housing.

Respectfully submitted,



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ATTACHMENT A

In the Title:

[CONVERSION METHOD FOR GAS STREAMS CONTAINING HYDROCARBONS]

APPARATUS FOR STREAM CONVERSION AND METHODS OF USE

In the Specification:

[0001] This application is a continuation of U.S. Patent Application Serial No. 09/597,289, filed June 20, 2000, entitled "APPARATUS FOR STREAM CONVERSION AND METHODS OF USE;" which is a continuation of U.S. Patent Application Serial No. 09/006,739, filed January 14, 1998, entitled "CONVERSION METHOD FOR GAS STREAMS CONTAINING HYDROCARBONS," now U.S. Patent No. 6,159,432; which is a continuation-in-part application of [co-pending] U.S. Patent Application Serial No. 08/813,813, filed March 6, 1997, entitled "METHOD OF CONVERTING A GAS STREAM CONTAINING HYDROCARBONS TO COMPLEX HYDROCARBONS HAVING AT LEAST TWO CARBON ATOMS," now abandoned; and which claims [the benefit] priority under 35 U.S.C. § 119(e) of U.S. Provisional Application Serial No. 60/035,900, filed January 23, 1997, entitled "METHOD OF CONVERTING A GAS STREAM CONTAINING HYDROCARBONS TO COMPLEX HYDROCARBONS HAVING AT LEAST TWO CARBON ATOMS," the contents of which are hereby expressly incorporated in their entirety by reference.

[0002] This invention was developed through assistance with the U.S. Department of Energy, under contract number DE-FG21-94MC31170. The Government has certain rights in this

invention.

In the Claims:

1. (Once Amended) An apparatus for converting a gas stream containing hydrocarbons to a reaction product containing effluent molecules having at least one carbon atom, comprising:
- a housing, having at least one interior surface and at least one exterior surface;
- a first electrode and a **spatially disposed** second electrode[, **wherein the first electrode and the second electrode are selectively movable in relation to each other and positioned within the housing so as to be spatially disposed a predetermined distance from each other**];
- means for producing a plasma discharge between the first electrode and the second electrode;
- means for passing the gas stream containing hydrocarbons between the first electrode and the second electrode; and
- means for collecting the reaction product effluent produced by the reaction of the gas stream containing hydrocarbons with the plasma discharge between the first and second electrodes.
2. (Once amended) The apparatus of claim 1, wherein at least one of the first and second electrodes is positioned [**substantially outside**] **within** the housing [**and at least one of the first and second electrodes is positioned substantially within the housing**].
10. (Once amended) The apparatus of claim 1, further comprising means for condensing

the effluent wherein the condensing means is operably located within the housing.

31. (Once amended) The apparatus of claim 30, wherein the zeolite is chemically [or] altered, physically altered [so as], combined with other components, or combinations thereof, to provide a zeolite having a substantially changed activity.

32. (Once amended) A method for converting a gas stream containing hydrocarbons to a reaction product effluent containing molecules having at least one carbon atom, comprising the steps of:

providing an apparatus, wherein the apparatus comprises,

a housing having at least one interior surface and at least one exterior surface,

a first electrode and a spatially disposed second electrode, [wherein the first and second electrodes are selectively movable in relation to each other and positioned within the housing so as to be spatially disposed a predetermined distance from each other,]

means for producing a plasma discharge between the first and second electrodes,

means for passing the gas stream containing hydrocarbons between the first and second electrodes; and

means for collecting a reaction product effluent from the housing;

producing a plasma discharge between the first and second electrodes;

introducing a gas stream containing hydrocarbons into the housing, wherein the gas stream is passed into the plasma discharge causing the hydrocarbons within the gas stream

to be converted into reacted hydrocarbons having at least two carbon atoms; and
collecting the reacted hydrocarbons as an effluent from the housing.

33. (Once amended) The method of claim 32, wherein in the step of providing the apparatus, the apparatus further comprises at least one spacing member operably associated with at least one of the first and second electrodes **[for spatially maintaining the first and second electrodes at the predetermined distance]**.

41. (Once amended) The method of claim 39, wherein in the step of condensing the effluent, the condensed effluent is a liquid.

62. (Once amended) The method of claim 61, wherein in the step of providing a layer of material, the zeolite is chemically **[or] altered**, physically altered **[so as] , combined with other components, or combinations thereof** to provide a zeolite having a substantially changed activity.

63. (Once amended) A method for converting a gas stream containing hydrocarbons to a reaction product effluent containing molecules having at least one carbon atom and at least some of the molecules containing an oxygen atom, comprising the steps of:

providing an apparatus, wherein the apparatus comprises,

a housing having at least one interior surface and at least one exterior surface,

a first electrode and a spatially disposed second electrode, **[wherein the first and**

second electrodes are selectively movable in relation to each other and

**positioned within the housing so as to be spatially disposed a
predetermined distance from each other,]**

means for producing a plasma discharge between the first and second electrodes,

means for passing the gas stream containing hydrocarbons between the first and
second electrodes; and

means for collecting the reaction product effluent from the housing;

producing a plasma discharge between the first and second electrodes;

introducing a gas stream containing hydrocarbons and oxygen into the housing, wherein the
gas stream is passed into the plasma discharge causing the hydrocarbons within the
gas stream to be converted into reacted hydrocarbons having at least two carbon
atoms; and

collecting the reacted hydrocarbons as an effluent from the housing.

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